

Averages, range and sampling

Exam questions

Foundation and Higher tiers

Please write clearly in block capitals.

Name

Class

Teacher

Time allowed: 115 minutes

Materials

For this booklet you need a black pen, a pencil, a ruler, a rubber and a calculator for Section B.

Instructions

- Use black ink or black ballpoint pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided.
- **Section A** (questions 1 to 14): you must not use a calculator.
- **Section B** (questions 15 to 27): you may use a calculator.
- Do all rough work in this booklet. Cross through any work you do not want marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this booklet is 103.

Advice

- Read each question carefully.
- In all calculations, show clearly how you work out your answer.

For teacher's use

Q	Mark	Q	Mark
1		15	
2		16	
3		17	
4		18	
5		19	
6		20	
7		21	
8		22	
9		23	
10		24	
11		25	
12		26	
13		27	
14			
TOTAL			

Section A



You must not use a calculator

Do not
write
outside
the box

- 1** Here are the numbers of seedlings that came up in nine seed trays.

14 17 12 17 15 9 17 13 16

- (a)** Write down the mode.

Answer _____

[1 mark]

- (b)** Work out the range.

Answer _____

[1 mark]

- 2** Ama counts the birds that visit her garden feeder on eight mornings.

5 12 8 3 14 10 7 11

- (a)** Circle the median number of birds.

8.5 8.75 9 11

[1 mark]

- (b)** Ama says,
"The mean number of birds is more than the median."
 Is Ama correct?
 You must show your working.

[2 marks]

3

A librarian records how many books each of 40 visitors borrows.

Do not
write
outside
the box

Number of books	Frequency
0	4
1	12
2	7
3	9
4	8

(a) Write down the mode.

Answer _____

[1 mark]

(b) Work out the mean number of books borrowed.

Answer _____

[3 marks]

- 4 Mo has four number cards.



Mo adds one more number card.

The mean of the five cards is 1 more than the mean of the four cards.

Work out the number on the new card.

Answer _____

[3 marks]

- 5 Here are the ages, in years, of the eight people at a pottery class.

31 28 35 33 82 30 29 32

- (a) Work out the mean age.

Answer _____ years

[2 marks]

- (b) Kit says,
"The mean is a good average to use for these ages."
 Is Kit correct?
 Give a reason for your answer.

[1 mark]

- 6** There are 840 students in a school.
Ravi asks 60 students in Year 7 how they travel to school.
18 of them say they walk.

- (a)** Ravi uses his results to estimate the number of students in the school who walk to school.
Work out his estimate.

Answer _____

[2 marks]

- (b)** Give one reason why his estimate may not be reliable.

[1 mark]

- 7** Ana and Cara each shoot six arrows at a target.
The table shows information about Ana's scores.

Mean	Range
8	4

Here are Cara's scores.

10 10 4 10 10 10

Compare the scores of the two archers.
You must show your working.

[4 marks]

- 8** Here are the prices of a sourdough loaf at seven bakeries.

£2.35 £1.89 £3.10 £2.60 £1.95 £2.75 £2.49

- (a)** Work out the median price.

Answer £ _____

[1 mark]

- (b)** An eighth bakery also sells the sourdough loaf.
The median price at all eight bakeries is £2.52
Work out the price of the loaf at the eighth bakery.

Answer £ _____

[2 marks]

- 9** Lucy thinks of five positive whole numbers.

The mode is 4

The median is 5

The mean is 7

The range is 9

Work out Lucy's five numbers.

Answer _____

[3 marks]

10

Here are the masses, in kilograms, of 11 parcels at depot A.

2.4 3.1 1.8 4.6 2.9 3.5 2.2 5.0 3.3 2.7 3.8

(a) Work out the median.

Answer _____ kg
[1 mark]

(b) Work out the interquartile range.

Answer _____ kg
[2 marks]

(c) For the parcels at depot B
the median is 2.6 kg
the interquartile range is 1.9 kg

Compare the masses of the parcels at the two depots.

[2 marks]

11

The table shows how many times each member of a running club went running last week.

Number of runs	Frequency
1	5
2	x
3	9
4	6

The mean number of runs is 2.5

Work out the value of x .

Do not
write
outside
the box

Answer _____

[4 marks]

- 12** Bea has a list of 15 numbers.
The mean of the numbers is 12
The range of the numbers is 9

She multiplies each number by 3 and then subtracts 2

- (a) Work out the mean of the new numbers.

Answer _____
[1 mark]

- (b) Work out the range of the new numbers.

Answer _____
[1 mark]

- 13** Nia has n number cards.
The mean of the numbers on her cards is 6
- She makes three more cards.
Each of the three new cards has the number n on it.
The mean of the numbers on all of her cards is now 7.5
- Work out the value of n .

Answer _____
[4 marks]

14

Here are five numbers written in order of size, smallest first.

$$3 \quad x \quad 2x - 1 \quad x + 6 \quad x^2$$

The mean of the five numbers is 4 more than the median.

Work out the range of the five numbers.

Do not
write
outside
the box

Answer _____

[5 marks]

Section B

You may use a calculator

Do not
write
outside
the box

- 15** A wildlife rescue centre weighs six hedgehogs.
Here are their masses, in kilograms.

0.84 1.12 0.67 0.95 1.08 0.79

- (a)** Work out the range of the masses.

Answer _____ kg
[1 mark]

- (b)** Work out the mean mass.
Give your answer to 2 decimal places.

Answer _____ kg
[2 marks]

- 16** A robotics club records how long its robot takes to solve a maze, on ten attempts. Here are the results, in seconds.

41.38 39.87 44.05 40.12 38.96
42.71 39.54 43.30 40.68 41.95

- (a)** Find the median.

Answer _____ seconds
[2 marks]

- (b)** On an eleventh attempt the robot takes 39.2 seconds.
Find the median of all eleven results.

Answer _____ seconds
[1 mark]

17

A bakery takes orders for celebration cakes.

The table shows the number of cakes in each order last year.

Number of cakes in the order	Number of orders
1	138
2	95
3	61
4	44
5	22

- (a) Work out the total number of cakes ordered.

Answer _____

[2 marks]

- (b) What percentage of the orders were for more than 2 cakes?
Give your answer to 1 decimal place.

Answer _____ %

[2 marks]

- 18** A drone can carry a total mass of at most 50 kg of parcels on one flight.
13 parcels are loaded onto the drone.
The mean mass of these 13 parcels is 3.74 kg.

Can one more parcel of mass 1.45 kg be loaded onto the drone?
You must show your working.

[3 marks]

- 19** A farmer has 2000 apples in a store.
He weighs a random sample of 8 of the apples.
Here are their masses, in grams.

142 158 136 151 149 163 140 145

- (a)** Work out the mean mass of the apples in the sample.

Answer _____ g

[2 marks]

- (b)** Use your answer to part (a) to estimate the total mass of all 2000 apples.
Give your answer in kilograms.

Answer _____ kg

[2 marks]

- (c)** How could the farmer make his estimate more reliable?

[1 mark]

20

A shop records the size of each pair of walking boots it sells in one month.

Shoe size	Number of pairs
4	3
4.5	5
5	9
5.5	12
6	8
6.5	6
7	2

- (a) Work out the mean shoe size.
Give your answer to 2 decimal places.

Answer _____

[3 marks]

- (b) The manager wants to decide which size of boot to order the most of.
Which average should she use?
Give a reason for your answer.

[1 mark]

Do not
write
outside
the box

- 21** The table shows information about the distances, d kilometres, cycled by 47 people in a sponsored ride.

Distance (d km)	Frequency
$0 < d \leq 10$	5
$10 < d \leq 20$	14
$20 < d \leq 30$	12
$30 < d \leq 40$	10
$40 < d \leq 50$	6

- (a) Write down the modal class.

Answer _____

[1 mark]

- (b) Work out an estimate of the mean distance.
Give your answer to 1 decimal place.

Answer _____ km

[4 marks]

- (c) Explain why your answer to part (b) is an estimate.

[1 mark]

- 22** 18 adults and 12 children take part in a quiz.
The mean score of the adults is 41
The mean score of the children is 36.5

(a) Work out the mean score of all 30 people.

Answer _____

[3 marks]

(b) Jo works out the mean score of all 30 people like this.

$$(41 + 36.5) \div 2 = 38.75$$

Explain why Jo's method is wrong.

[1 mark]

- 23** Mr Okafor works out that the mean mark of the 28 students in his class is 61.25
He then finds that he typed one student's mark as 47 instead of 74

(a) Work out the correct mean mark.
Give your answer to 2 decimal places.

Answer _____

[3 marks]

(b) Explain why the correct median cannot be lower than the median he worked out.

[1 mark]

24

A café sorts its customers into three groups.

Do not
write
outside
the box

Group	Percentage of customers	Mean amount spent
Breakfast	35%	£12.40
Coffee only	45%	£8.15
Lunch	20%	£21.60

- (a) Work out the mean amount spent by all of the café's customers.

Answer £ _____

[3 marks]

- (b) The café wants the mean amount spent by all of its customers to be £13
The percentages and the mean amounts spent for breakfast and for coffee only stay the same.
What would the mean amount spent for lunch need to be?

Answer £ _____

[2 marks]

25

In a gymnastics club there are 24 girls and some boys.

They all do a fitness test.

The mean score of the girls is 8.5

The mean score of the boys is 7

The mean score of everyone in the club is 7.9

How many boys are in the club?

Do not
write
outside
the box

Answer _____

[4 marks]

26

A farm weighs 150 strawberries.

The table shows information about their masses, m grams.

Mass (m grams)	Frequency
$10 < m \leq 14$	9
$14 < m \leq 18$	a
$18 < m \leq 22$	47
$22 < m \leq 26$	b
$26 < m \leq 34$	6

Using the table, an estimate of the mean mass of the strawberries is 19.44 grams.

(a) Work out the values of a and b .

Answer _____

[5 marks]

(b) Which class contains the median mass?

Answer _____

[1 mark]

Do not
write
outside
the box

27

In a dance school, the ratio of the number of boys to the number of girls is 4 : 5
The mean height of the boys is 8% more than the mean height of the girls.
The mean height of all the pupils in the dance school is 152.4 cm.

Work out the mean height of the boys.
Give your answer to 1 decimal place.

Answer _____ cm

[4 marks]

END OF QUESTIONS